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SOUNDINGS IN NON-EUCLIDEAN ECONOMICS

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It is fairly obvious, if one stops to think of it, that there are systems of economics with axioms fully as far removed from each other as the geometrics of Euclid and the non-Euclidean; perhaps as far apart as the conventional physics and Einstein. Probably the foremost non-Euclidean economist is Professor Veblen, and his theory of invidious prestige might be called a theory of economic relativity.

Orthodox economics undertakes to interpret equilibrium: Veblen undertakes to interpret progressive change. And in the social world this is much the same as saying that orthodox economics studies the assumptions of contentment and Veblen the assumptions of discontent, both of which are undeniable facts. Since undeniable facts are difficult to ignore, the net result is very largely to call them by different names. So when Veblen says that the inherent nature of business is parasitism and that any modicum of service rendered is rendered incidentally and in spite of the inherent nature of business; and when orthodox economics says that the inherent nature of business is service, and that any modicum of parasitism that may remain is an incidental perversion of the true spirit of the institution—they may not be contradicting each other quite so flatly as they seem to be. Veblen is talking about the nature of the pursuit of profits; and the beneficial effects of competition, where competition works beneficially, are an incidental check and very partial (and possibly a temporary one) on the natural tactics of the pursuit of gain. Orthodox economics is talking about the nature of competition (or perhaps of an ideal form of competition) as a check on human selfishness in the pursuit of profits and to them any failures of competition to produce its full effects appear as incidental. In a general way most economists admit the same general mass of facts, but pick out different ones as the central axioms of their systematic economic theorizing.

What do I mean by non-Euclidean economics in the present instance? The question can best be answered by taking six axioms which represent in a general way what might be called the orthodox position on a number of important points, and inverting them. One reason for calling this “non-Euclidean” is that, as I understand the attitude of non-Euclidean geometry, it does not necessarily insist that Euclid is nonsense nor declare implacable war on his system and insist on its immediate abolishment. It merely studies the possibilities and consequences of contrary assumptions. In the present instance this is not a mere game of logical gymnastics: it is the natural result of studying

those facts of human existence which Euclid, as represented by these six axioms, somehow fails to interpret. Much of what I shall have to say is not new—perhaps none of it is—but, after all, economic theory consists largely in organizing and interpreting known facts rather than in the independent discovery of raw facts hitherto unknown. Time permits little more than mention of the first four points, and a very brief development of the last two.

Proposition 1. Economics is the science of wealth, and wealth consists—of things (a) useful, (b) limited in supply, (c) exchangeable, (d) appropriable.

The alternative proposition is that the most important subjects of economic study, while useful and limited in supply, are not appropriable and not fully exchangeable, and thus are not wealth in the full sense.¹

Since the consequences of this have been developed by a number of writers, I will merely mention one very interesting corollary: namely, that in the marginal-productivity economics power to produce cannot exist apart from power to withhold. Many things may be useful and limited in supply, but only those which the owner has the option of withholding have a marketable marginal product. What is marginal productivity? It is essentially the power to make a differential addition to the income of an enterprise. This means to make this income greater if one grants the enterprise the use of the productive factor he controls than it would be if one withheld this productive factor. In this sense an invention, once made public, is not “productive,” and the inventor is not a productive factor, with respect to any past invention, except as he keeps patent rights which enable him to withhold it from the market, and hence to bestow it on the market. He cannot freely bestow it if he cannot also freely withhold it. Other applications of this proposition are interesting, but we must pass on.

Proposition 2. Consumption is the end of economic activity and production is a means to that end.

This proposition may be broadened; increased productive power is used to make working hours shorter and to some extent to make work easier and more pleasant. This is in general harmony with the proposition that production is looked on as a necessary evil and a means to an end: the less time we spend at it the better. The general proposition seems obvious, and is obvious from the point of view of the individual. When it comes to society's interest, the question is not so clear. So-

¹ The germ of this proposition is at least as old as John Stuart Mill (*Principles of Political Economy*, Book V, Chap. XI, sec. 14); Sidgwick also develops it (*Principles of Political Economy*, Macmillan ed., p. 404 ff.) and it plays an important part in J. B. Clark's *Philosophy of Wealth* as the “theory of inappropriables.”

ciety's purposes are supposed to have something ethical about them. To take consumption as the end of all things corresponds to hedonistic ethics, whose standard is the receipt of pleasurable sensations, but the more modern ethics emphasizes rather the well-rounded development and use of human faculties. It is an active and not a passive standard, a standard of output of energy and not of receipt of sensation.

This makes it seem that our activities are more important than the passive pleasures we receive, and the activities that really develop us most are those where we are faced with the biggest difficulties. This means, commonly, things we would not voluntarily do simply for the fun of doing them. It means work, in one form or another, rather than play. The conclusion is that the quality of the activity involved in work is more important as a positive social value than the quantity or quality of consumption.²

There is a twofold need: for work of a sort which, if a man gives his best to it, will develop and not crush him; and for incentives that will make him give his best. And the two needs are more nearly one than economic theory is accustomed to assume. Starvation, poverty, and ambition for increased wealth have successively worked themselves past the point of diminishing return as incentives for the mass of labor, and the search for new incentives must focus on other things than wage-scales. In this respect, the worst evil is to deny those incentives that represent what man recognizes as best in him. If selfish incentives cease to work, that is a failure: if unselfish incentives have no opportunity to work, that is a tragedy. The partial breakdown of the traditional selfish incentives in industry, which is now disturbing many minds, may prove a blessing in disguise, and one of the greatest of social opportunities.

Proposition 3. The standard of economic service is the gratification of human wants through the increase of marketable goods and services.

This does not intend to deny that the development of good types of human beings is a more important thing, but it singles out increased wealth as the economic way of making possible the development of the best human type, leaving humanity to use its power as its wisdom or folly may suggest.

In this matter economics has tried to keep itself separate from ethics and to take the attitude that it is not concerned, as economics, with the wisdom of the use men make of wealth. Its ideal is well ex-

² This idea, again, is not new. It goes back to Ruskin and William Morris, and back of them to the Greeks who graded occupations according as the kind of activity involved was or was not consistent with the "good life" as they saw it. Modern studies of human nature are trying to give us more scientific standards of judgment in these matters, and the results so far are promising and valuable.

pressed in the maxim of Francis Bacon, quoted by Jevons in the introduction to his *Theory of Political Economy*: "While philosophers are disputing whether virtue or pleasure be the proper aim of life, do you provide yourself with the instruments of either."³ It has, then, as an ideal a sort of undifferentiated power over nature which man is to secure, and which he can then put to any use, good or bad. The increase of this power is economic gain: the quality of the use made of it is a separate question and not an economic one. This is a very natural position, but there is one trouble with it. The methods of production which increase our power have in themselves qualitative effects on human living of a very direct sort, some of which have already been mentioned. And these effects on the quality of life are not marketable commodities which can be weighed in the same financial scale with the increased supply of commodities which modern industry furnishes.

Moreover, it may be argued that the tendency of population to increase has the effect of neutralizing the greater part of man's increased productive power, so that by far the greater part of it goes in maintaining increased numbers in the face of the principle of diminishing returns, and the increase in per capita wealth is but a small fraction of the percentage of increase in our essential power over nature. One might go farther and say that it is a positive injury for humanity to learn enough about the arts of production to use up all the best of the earth's limited natural resources and occupy all the available territory, until they have learned how to put them to some better use than, for example, they have been making of them in the past six years.

I am not advocating inefficiency, though there are some sorts of inefficiency for which a good deal might be said. So long as war exists, any civilization that systematically practiced inefficiency for the good of future generations would be speedily displaced by one with less refined ideals and more immediate horsepower. Efficiency is inevitable and, in moderation, not undesirable. But what I am suggesting is that, instead of taking the quality of man for granted and focussing attention on quantity output, it is much more pertinent for the social student to take quantity output for granted—business will not neglect that—and direct his chief attention to the qualitative effects on humanity of the things they do in their inevitable (but largely self-defeating) striving after increased per capita wealth.

One might suggest that in the economy of nature and of her creatures means and ends are reversed: that the creature's ends are nature's means of gaining her ends, and the activities which serve the creature as means of attaining his ends are the things nature is really after.⁴

³ This is the concluding sentence of Jevons' Introduction (4th ed., Macmillan, p. 27.)

⁴ If this figurative personification of nature appears unscientific, nature's purposes

Primitive man is interested in stilling his hunger and to get food he endures enormous fatigues, taxes his rudimentary ingenuity, and perhaps makes a minute improvement in the stone axe or the bow. Nature is not interested in stilling his hunger; in fact, she takes very effective measures to see to it that he shall be chronically hungry in order that he may continue to endure fatigues, to tax his ingenuity, to struggle, and as a result to develop biologically into a type with higher faculties. Now that we have supplanted nature's jungle with our man-made jungle of mines, factories, railroads, hotels, jails, hospitals, almshouses and what not, who is strong enough to do what the older jungle did for our ancestors—overrule our purposes for our own good and save us from the danger and possible biological disaster of getting what we think we want?

Proposition 4. As a general rule, cost varies in proportion to output: "overhead costs" which are independent of output are the exception and arise in connection with large fixed capital only.

As an alternative, consider the proposition that overhead costs are not merely the general rule but are universal, and that the costs that are "direct," or "variable" or "prime costs" from the standpoint of the employer are overhead costs from the point of view of society. Every laborer is his own "overhead" and has his constant costs to meet, whether he is working or not. Society has so much productive power. It cannot avoid the cost of either (1) maintaining this productive power, including the human beings who compose most of it, or (2) seeing it depreciate. The power of the entrepreneur to reduce expenses by reducing his working force, where this means unemployment, is for the most part a financial illusion arising out of the fact that the individual employer does not have to pay the constant costs of the labor he turns off.⁵

This principle has many possible applications, largely in the direction of placing the burden of labor's overhead cost on those bearing chief responsibility for the industrial cycle, and where it will have the greatest effect in stimulating people to do things to relieve the irregularities. It is one tremendously important instance in which social accounting and business accounting diverge and in which the social accounting is not yet organized and explicit.

Proposition 5. The rational foresight of individuals is at the basis of individualistic economics. In particular: business men know the

with man may be translated as the requirements of man's biological development, which undoubtedly contain a sounder standard of human welfare than the gratification of his immediate conscious desires.

⁵ This general point has been developed by G. P. Watkins: "A third Factor in the Variation of Productivity." *AMERICAN ECONOMIC REVIEW*, V. 753, 770-77.

"best combination of factors" and the marginal productive worth of different factors, and on this the efficiency of individualism depends. The question at issue is not whether people are thus intelligent, but whether an economics, founded on the idea that they are, is really a sound basis for individualism.

Let us study for a moment a hypothetical society made up of individuals gifted with this degree of intelligence and foresight. Would this be peculiarly favorable to individualism? Business would be highly efficient, it is true, but there is serious question how long beings with this much foresight would continue to compete. Such beings would not let the coal business run in the wasteful way which was described to us this morning. They would long since have introduced such methods as Mr. Mason and others spoke of, and in the process they would have integrated the industry to a point where wagon-mines and backyard wheelbarrow mines could not offer serious competition to the organized large-scale producers. And there would be a Federal Commission.

Perhaps in this hypothetical society employers and employees in, let us say, the building trades, might both get tired of the competitive struggle and unite to assist each other in excluding competitors. If they were very foresightful they might cover up their tracks so well that even Mr. Untermeyer might have difficulty in getting evidence enough to make a case. The "best combination of factors" in this case would consist in putting some of the very best brains to work on covering up tracks, and the marginal worth of high-grade brains in this occupation would be extremely high. Since the employers would know all this, highgrade brains would be so employed and lavishly rewarded. On the other hand, the marginal worth of brains spent in detecting such conspiracies would also be very high, and government would know this (by hypothesis) and would bid against private enterprise for the same grade of brains. Thus a large part of society's ability would be devoted to this interesting game of hide-and-seek; to making and contesting valuations of properties; to checking up accounts, inspecting products to enforce standards of quality and service, and many other similar occupations; and their pay would absorb a considerable part of the national income.

Meanwhile, if people in general could choose intelligently for the future they could and would vote intelligently and select able and honest officers of government, and government departments would be very efficiently run because their heads would know the "best combination of factors," and the "marginal worth" of talent, and would be able to get appropriations that would enable them to bid for it. Their budget system, based on knowledge of the relative marginal worth of different

lines of public expenditure, would furnish something society has long needed—a system of social accounting in terms of national welfare. Thus we should have on the one hand enormous waste in the attempt to control private industry, and on the other hand government departments quite as efficient as private concerns and able to avoid the wastes and duplications either of competition or of regulation. Under these conditions any people with such intelligent foresight as we have assumed could not fail to see the obvious advantages of national collectivism, and we might expect to see it adopted as rapidly as an efficient government bureau could handle the necessary accounting.

But suppose, on the other hand, we assume a population of little foresight, who therefore cannot safely depart far from custom, who are governed much by imitation and suggestion from their fellows, who learn only by making mistakes and being hurt, and who do not know the “best combination of factors” nor the marginal worth of different factors of production. In such an imaginary society, private production would not be very efficient, judged by absolute standards of what is technically possible. On the other hand, a considerable amount of competition would survive for a long time, perhaps indefinitely; partly because it is customary, partly because competitors do not look far ahead, and partly because they are influenced by the suggestive force of a moral code which considers monopoly as contrary to the public interest.

With competition, however, goes a weeding out of the least efficient, which means eliminating the widest departures from the “best combination of factors” and from the system of paying factors of production according to their marginal worth to the employer, and placing them in industry on the same principle. The survivors would be those who, by luck or intuition, came nearest behaving as they would if they had known what the “best combination” was and what the marginal worth of productive factors was. The force of competition would put pressure on business to install cost accounting systems in order to lessen its ignorance of how much productive factors are worth, and to employ engineers and efficiency experts who, although they may not know the absolute “best combination,” may at least be able to devise ways of improving the combination that exists. Thus there would be forces working in the general direction of efficiency and of a rough approximation to an organization on the basis of marginal productivity.⁶

On the other hand, government departments would not only suffer

⁶ Professor J. B. Clark has, in lectures, made the point that the marginal productivity theory does not require perfect knowledge on the part of business men of what “marginal products” are; but that the force of competitive selection works in this direction automatically.

from not knowing what the "best combination of factors" was, but they would lack the saving grace of competitive elimination to work automatically in that direction, or to put pressure on their administrative heads to install efficient systems of accounting and research. In such a purely hypothetical society, we might expect that the accounting systems of government departments would be far inferior to those of private business; and would be, in fact, inadequate to show how much public services cost, let alone the marginal worth of different productive factors taking part in those services.

Not knowing how much factors of production were worth, government would tend to underpay the highest employees and fail to secure the highest talents in competition with private industry. Moreover, a people of this mental type would be less able to vote intelligently than to buy goods intelligently, since voting makes peculiar demands on the powers of foresight, while the buying of goods can be much less wastefully done by the method of trial and error. Most marketable commodities are renewed far oftener than is the incumbent of a political office, and of those that are not, few commodities are selected without more intelligent study of values than the average voter makes of the average candidate on the average American long ballot.⁷ Thus in this hypothetical society there would be less chance of getting able public officers than able business men. And though the absolute efficiency of private enterprise would be far less than in our first hypothetical society, that of public enterprise would suffer still more. In the second society, private enterprise would be more efficient than public.

The tendency to combination would undoubtedly appear, though restrained by the custom of competition and the moral mandate for it. The attempts of government to curb combination would be largely abortive, but the people might still prefer a moderate degree of exploitation to the inefficiency of government operation, or to the effort and uncertainty of conceiving and working out some other substitute for individualism. After some trying experiences, business would probably learn to keep its exploitation within the limits of the people's toleration, not so much from shrewd calculation as from natural hesitation to break with custom and morals, and from the habit of feeling one's way in any new policy. And thus individualism might continue.

Thus it appears plausible that the strongest basis for individualism is not the intelligence of individuals and their irrevocable devotion to the pursuit of their own self-interest, but rather their stupidity and their susceptibility to moral suggestion. Individualism may be re-

⁷ Cf. T. N. Carver's suggestive comparison of political and economic competition in his *Principles of Political Economy*, p. 328, and in his *Essays in Social Justice*, pp. 111-25.

garded, not so much as the system calculated to get the utmost out of a people of extremely high intelligence as the system in which human stupidity can do the least harm. All of which is not so very new, but is more akin to the general trend of Adam Smith's economics than to the Austrian school, and really harks back from marginal utility economics to the earlier classical proposition that individuals can choose for themselves—not with absolute accuracy—but better than any government agent can do it for them. This is a theory of relativity rather than one of the absolute efficiency of individualism as a system by itself.

After all, at the present time one of the most important facts concerns, not the general level of intelligence, high or low, but the differing degrees of training and special information on different topics; the extent to which the specialist in this age of specialists has information beyond the unspecialized man in the street, and the ability of the unspecialized "people" to cope with the specialist who has his axe to grind. This is one of the very large problems for the "economic man" of the twentieth century.

Proposition 6. Capital, including machinery, consists of instruments of production utilized by human beings for the production of wealth.

Let me suggest the alternative proposition that human beings are instruments of production utilized by machines for the machines' increase and biological development. This is not a new idea. Samuel Butler carried it to the point of suggesting that machines might develop consciousness and thus enslave mankind, though in these days of behaviorist psychology the question whether the ruling race possesses consciousness or not may be regarded as obsolete. A more real question is: how many and how important and far-reaching are the things the machines have done to us which we did not intend nor foresee, compared to the things we specifically employed them to do? On this point, some things have already been said (sections 2 and 3 above).

Among economists and social scientists, Veblen has described how machines train and educate human beings.⁸ A. S. Johnson has pointed out how the nominal captain of industry is ruled by the processes he presides over.⁹ Cooley has asserted the existence of impersonal forms of life with life-processes independent of those of the human beings who impinge on them and further their growth, and he mentions industrialism as one of these forms of life.¹⁰ The *Economic Interpretation of History* implies that the machines control human life and organization in its highest forms.

⁸ *The Instinct of Workmanship*, pp. 311-27.

⁹ "The Soul of Capitalism," *Unpopular Review*, April-June, 1914, pp. 230-1.

¹⁰ *Social Process*, pp. 6-26.

Machines may be conceived as making bargains with man in which they offer him things he very much desires, and in exchange bind him to serve and maintain them, to eliminate the unfit among them and promote their racial progress, and to alter his own social and political arrangements in whatever ways may be necessary in keeping pace with the increasingly complex social organization of the machines themselves, and in keeping the children of man faithful to the service the machines require. The full nature of the terms of these bargains are not revealed to man until he is so fully committed that it is too late to turn back, and thus the machines outwit him. For example, they took Adam Smith into their confidence, but only so far as suited their purposes. By such methods they have succeeded in imposing on man many things he never bargained for, some of which he finds extremely unwelcome.

Some might think this shows a low standard of honesty on the part of the machines, but we must remember that honesty is the morality of equals toward equals, not of superior to inferior races, and that our own conduct toward inferior races will hardly stand a critical examination. At least machines have not forced their culture upon us by armed violence. Among their own kind, they show a sense of the superior importance of biological progress to immediate gratification and a subordination of the interests of the individual machine to the progress of the race, which demonstrate a clear moral superiority. Seldom or never, as in Arnold Bennett's *Milestones*, does the older generation cramp the development of the younger. They give way without complaint, youth is served, and the interests of mechanical posterity are paramount.

The machines appear to have kind intentions toward man, but to lack understanding of many of his feelings and needs; as is frequently the case with ruling and subject races. They have revolutionized both work and product, taking the element of universal individual initiative out of both. They have given man unnatural working conditions which are now leading to incipient revolt, and living conditions that go far to defeat democracy. They are responsible for the "industrial cycle," and as long as their own overhead costs are covered in periods of depression, they have not assumed full responsibility for the corresponding overhead costs of human beings. They have largely taken over the drama without caring to preserve what human beings regard as the highest standards of taste, and they have, intentionally or unintentionally, gone far to undermine the church and even religion itself. They have incontinently switched us from a paternalistic to a laissez-faire type of government and are now busily switching us back again, according to the temporary needs of the stage of development they have reached. These are merely examples.

As for their methods of maintaining control: some classes they bribe with large rewards, other classes, largely technicians, and technical-scientists, do not need to be bribed: their minds are captured by the material they work in. And the unspecialized "ruling classes," voters or congressmen or others, cannot cope with these specialists, who are left to do more and more of the governing in the shape of the actual working out of things. The ordinary man cannot even speak the dialect in terms of which many of these issues are settled; for example, the accounting language used in settling the justice of street-car fares. The machines have cleverly limited human coöperation by splitting human language up into many dialects of many specialist groups, so that the highest common factor of intelligibility, so to speak, for humanity as a whole, consists of relatively simple ideas, largely obsolete in the sense of not actively gripping the newer issues. Among these ideas might be mentioned the simple ideas of public and private ownership. As men become more dependent on machines, the latter become able to rule by penalties as well as by rewards: for example, our recent heatless Mondays and other penalties imposed by failure to develop our railroad system to a continually increasing size and complexity of articulation. Thus mankind moves in directions it never intended, getting largely things it never definitely wanted as the unexpected result of engaging the services of unexpectedly powerful instruments.

What I have called Euclidean Economics, in general, serves the interests of the machines. It directs attention to the bribe they offer, and away from the conditions they exact. It has countenanced the machines in neglecting to assume the burden of human overhead costs, and in this, as in other matters, by insisting on putting man on a higher level than machines in respect to freedom, it has sometimes put him on a lower level in respect to care for his material needs. This has its fine side, but by teaching man that he is the end of all things, when he is not, his subjection is concealed and thus perhaps perpetuated.

I do not advocate revolting against the machines and abolishing or subjugating them: all I aspire to is a reasonable degree of racial equality. This would make for more friendly relations and would help to allay the distrust of the purposes of the machines which now prevents us from getting all the benefits which they are able and willing to give us. This is peculiarly true of labor, but not of labor alone. This morning the machines, *via* Mr. Mason and others, made us a most alluring offer of increased coal production and I noticed this intelligent assemblage looking this gift horse in the mouth, debating whether this would force upon us a federal commission or federal operation, and whether we wanted these changes in our economic and political order. This distrust is a hopeful sign so long as we cannot tell what kind or

degree of social and political transformation the machines would force upon us. It marks a notable advance on the usual method of accepting the offer first and railing at the consequences afterward. But we must become far better informed and surer of our own intentions before our dealings with the machines can be characterized by that confidence which marks the bargaining of equals. To attain this we must not merely develop the ability to rise superior, if necessary, to the immediate bribe that is offered us; we must become competent to bargain, as the machines do, with an intelligent eye to our long-run racial and social interests.

These interests are most seriously threatened in the case of labor. The machines tend to confine discretion in industry to the few whom they take into their confidence, while the bulk of labor has largely lost the power to make any constructive contribution to the technique of industry. The job belongs to the machine, and labor feels little responsibility for it. Labor's state of mind and conduct shows the consequences of this, and many laborers appear to alternate between the slave-morality of getting as much as possible and giving as little, and the spasmodic need of exerting power of some sort. Under the circumstances this can only be power to interfere with the orderly progress of industry by strikes or sabotage, since power to improve on the operations laid down by the machines appears to be beyond labor's present reach, either for lack of competence, ambition, or opportunity. Racial equality can never be established so long as the bulk of mankind are in this position of undignified and passive inferiority.

The situation demands social organizations capable of exerting the force of constructive human will enlightened by collective intelligence, *at the point where things are being decided, in the processes of industry itself*, rather than waiting till the decision is made and then, through our "political" machinery, taking belated and purely defensive action.

TRADITIONAL ECONOMIC THEORY—DISCUSSION

IRVING FISHER.—In commenting on the foregoing papers, I will only say that I feel that there is an undue tendency to react against theories of marginal utility because we have expected more of them than they have yielded. Such revulsions of feeling create alternate fashions in economic theory, and fashions should have no place in science. There is a solid basis of truth in the theories of marginal utility which should not be lost but used as foundations on which to build.

FRANK H. KNIGHT.—Considerable courage is doubtless required to say anything in defense of economic theory in any of its familiar aspects after the presentation of these two papers, not to mention those given this afternoon, in which "theory" has been pelted with missiles of every degree of